

# Study of Software Quality Metrics, Models & Standards

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## ABSTRACT

*The aim of this paper is to provide a basis for the models of software quality. Software Quality model is a critical to obtained data so that procedures can be taken to increase the results and performance. These improvements can be calculated in terms of improved satisfaction of customer, quality and diminished cost for quality. The Software quality standards are a guide by while developing quality models which are also discussed here. Software metrics and quality models are very important for the measurement of software quality. A large number of famous quality models being used to make quality software. The different persons in their research have given large number of quality models for softwares to make easy in measuring the quality of software products. In our paper, we are going to discuss the different quality models of software and compare the software quality models with one another. The paper results collective with other information gives support for suggestions in the research of upcoming software quality model.*

## INTRODUCTION

Software metrics are important entity within in the entire software life cycle. They provide tools for the software package development, including software requirement documents, designs, programs and tests. Fast developments of good scaled software have evolved quality that creates the standard trouble some to regulate. The prosperous execution of the management over software quality needs software metrics.

The ideas of software metrics proved to be coherent, comprehensible and well established, and lots of metrics associated with the product quality are developed and used. Software Quality refers to any measurable characteristics such as correctness, maintainability, ability to port, testability, usability, reliability, efficiency, integrity, reusability and ability to operate by interchanging. In technical terms, quality is: conformity to specification Meeting client desires Fitness to be used.

## STUDY OF SOFTWARE METRICS

Good metrics ought to alter the event of models that are reasonable of predicting

method or product range. Thus, optimum metrics ought to be:

- Simple, exactly definable—so that it's clear that in which way the metric will be accessed;
- Valid—the metric ought to measure what it's supposed to measure;
- Simply obtainable (i.e., at reasonable cost)
- Objective, to the best level possible; and
- Robust—insensitive to irrelevant changes within the method or product.

### Types of software Metrics

There are basically 3 types of software metrics: process metrics, project metrics & product metrics.

#### 1) Process Metrics

Process metrics describes the process and method for software development. It basically aims at time taken by process, value encountered and type of methodology used. Process metrics may be familiarized augment software development and maintenance. The examples hold the usefulness of defect ejection all through development, the model of testing defect arrival, and also the time taken in reacting to fix process.

#### 2) Project Metrics

Project metrics are familiarized monitoring project scenario and status. Project metrics avoid the potential risks or problems by standardizing the project and make possible to optimize the software development process. Project metrics explains the project implementations and features. Eg.s involve the large number of developers, the cost of

the software, the staffing prototype above, the schedule of the software, productivity and life cycle of the software.

#### 3) Product Metrics

Product metrics gives the elements of the product of the software at any point of its development. Product metrics measures the size of the program, difficulty of the software design & its performance, ability of being portable, retainability, and scale of the products. Product metrics are familiar, presume and invent the standard of the merchandise. Product metrics basically measures the medium or the final product.

### Software Quality Models

Software quality model can be a demonstration of the features of the software package that explains its quality. The main purpose of quality models is to achieve Quality (more quality factors) with worth and performance as prime thought.

The 2 Common Models are :

1. McCall's quality model (1977)
2. Boehm's quality model (1978)

McCall's software Quality Model (1977) : McCall's Quality Model (1977) McCall tries to bridge the gap between users and developers by that specialize in variety of software package quality issue that mirror each the users' views and therefore the developers' priorities.

The McCall quality model has 3 major views for outlining and characteristic the standard of a software product:

- Product revision (ability to bear alteration)
- Product transition (flexibility to new environments)

- Product operations (its operation characteristics)

**Product Revision:** These factors relate to the Testing and Maintainability of the software. It offers plan about flexibility, maintenance and Testing effort. Product review includes Maintainability --the effort required for finding and fixing any error in the program amongst its operative surroundings Flexibility -- the simple creating changes needed by changes within the operative surroundings and Testability -- the simple testing the program, to make sure that it's error-free and meets its specification.

**Product Transition:** To transfer a product from one platform to a different platform or from one technology to a different technology. PRODUCT TRANSITION is absolutely concerned about Portability-- the hassle needed to transfer a program from one particular environment to different one.

Reusability--the simple reusing software in a very different context.

Interoperability--the effort needed to couple the system to a different system.

**Product Operation:** In this factors are related with the convenience, Operational performance, easy usage and correctness. The Quality of operations of product depends upon Correctness--the level to that a program fulfills its requirement Reliability--the systems capability to not fail. Efficiency--further categorised into implementation strength and storage strength and generally which means the employment of the resources, e.g. Processor's time of processing, Integrity of storage--the prevention from unauthorized access of the program and Usability--the easyness of the software.

Boehm's software package Quality Model (1978):

In the Boehm's Quality Model (1978) Boehm try to qualitatively summarize the quality of the software by known set of attributes & metrics. Boehm's model is analogous to the mccall Quality Model in this it additionally presents a hierarchical quality model prepared around intermediate level features, high-level features, primitive features - each of that play a part to the level of quality. Boehm gave 3 levels of quality attributes: Primary uses middle constructs and Primitive constructs. This model is analogous to Mc call quality model, however in addition it includes hardware performance which was not there in Mc call quality model. Model reflects: the needs of the user with S/w Product. Works of resources is software package straight forward to learn and use is easy & helpfull, easily tested, properly coded & Maintained.

### Software Quality Standards

A standard is basically consist of rules that are globally followed. There are different visiona of quality standards: taking a systems vision (that smart management systems yield high quality); On taking an analytical view (that smart activity frameworks yield high quality). For examples: Quality Assurance Standards - part 3 and ISO 9000-3 Quality Management: tips for the applications of 9001 to the deliver, installation, development and maintenance of software. Quality measurement: IEEE Standard 1061-1992 for Quality of software Metrics Methodology.

### ISO 9000 Quality Standards :

ISO 9000 Quality Standards ISO 9000 describes quality assurance parts in generic terms that maybe applied to any business. It treats associate enterprise as a network of interconnected processes. To be ISO-complaint processes ought to adhere to the standards illistrated . Elements embody structure of the organisation, procedures, processes and resources. Ensures quality control, planning for good quality,improvement in quality.

### ISO 9001 :

ISO 9001 is a global standard which provides great guidance to S/W developers on the way to Implement, maintain and improve a quality software system capable of making certain high quality software Consists of twenty necessities which Differs from country to country.

### ISO 9001 requirements:

ISO 9001 needs Management responsibility. Quality system Contract review style management Document and data management.Getting control of client provided product, Product identification and traceability processmanagement assessment and testing control of assessment, mensuration and equipment.Ins pection and take a look at standing managementof non-confirming product Corrective and preventive Handling of actions, wrapping, storage, preservation and delivery manage- ment of quality records, Internal quality audits training which services Statistical techniques.

### ISO-9126 :

Since 1980 standardize the Quality factors ISO-9126 Model is used.The comparison of

products become easy with the help of this model.It encompasses Six major attributescontributory to the standard Functionality:

Characteristics connected with the action of purpose Reliability: Capability of software to take care of the performance of Software Usability: Effort needed to use the package Efficiency: Relation- ship b/w level of performance and quantity of resources Maintainability: Effort required to create modification, improvement Portability: Transfer of a software to another one.

### Conclusion:

The Software Metrics are very essential for products quality. With the help of Software Metrics the development of the Software Quality Models become easy.There are basically 2 standard Software Quality Models : mccall's quality model (1977) and Boehm's quality model (1978). These models were given for assuring the quality of the softwares being developed. There are some rules which are to be followed while developing any software which basically act as standards while developing any software. These rules are known as the Software Quality Standards includes ISO 9000, ISO 9001, ISO 9126 Quality Standards.

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